

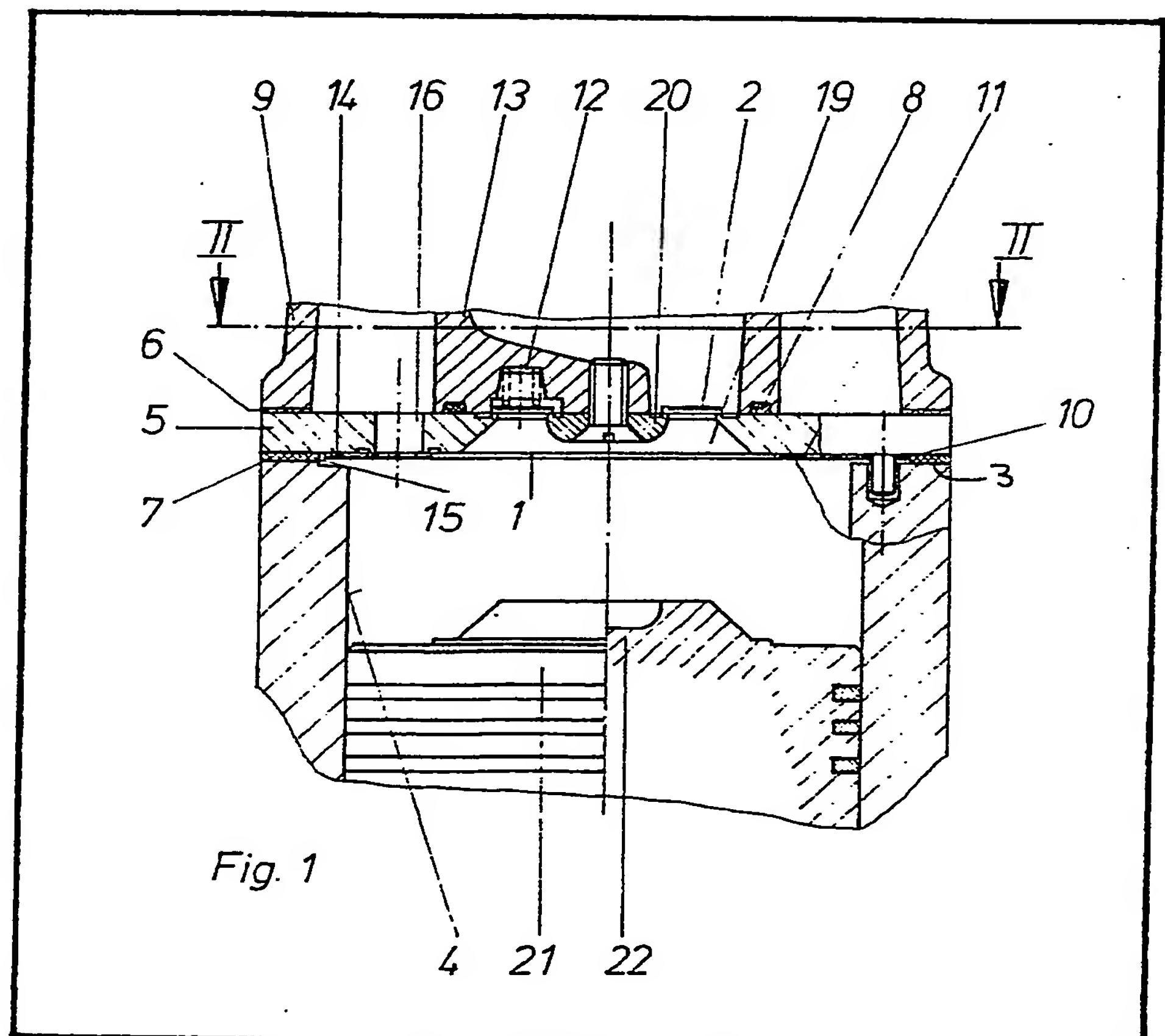
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 F1W  
 (71) Applicant  
 Dienes Werke Fur  
 Maschinenteile GmbH &  
 Co. KG.,  
 Kolner Strasse 7, D-5063  
 Overath 1, Federal  
 Republic of Germany  
 (72) Inventor  
 Gunter Haring  
 (74) Agents  
 Gill Jennings & Every,  
 53/64 Chancery Lane,  
 London WC2A 1HN

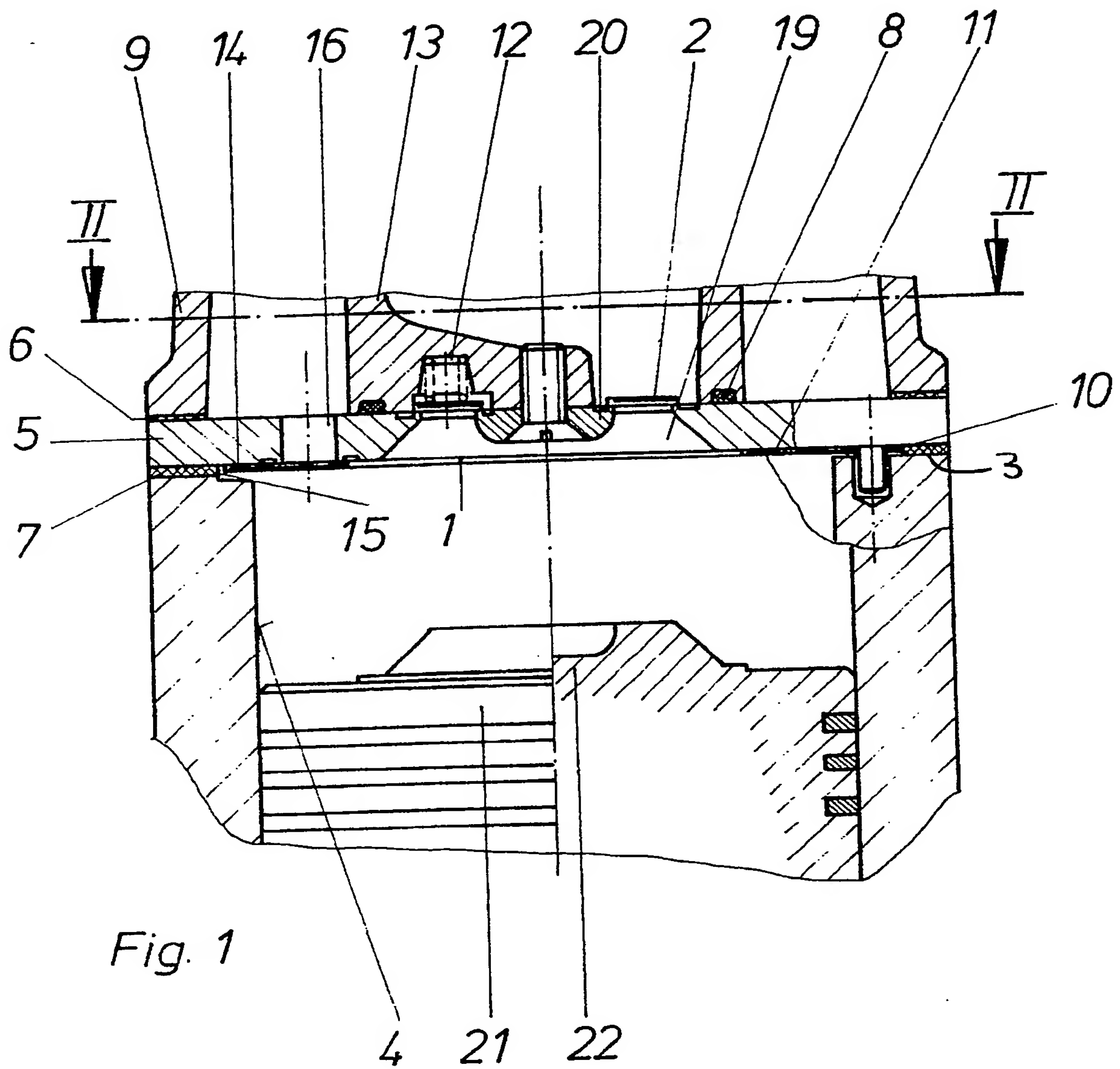
## (54) Piston Compressor

(57) A piston compressor, e.g. for small refrigerators, has an annular suction valve closure disc (11) which is clamped at its root (10) between the end wall (3) of a cylinder (4) and a seating plate (5) formed with suction inlets (16). The plate (5) is also

provided with a pressure outlet (19). The unswept volume of the cylinder is minimised by concentrating the suction inlets around a small arc diametrically opposite to the root (10), and by shaping an end (22) of the piston (21) so that it nests with the outlet (19) in the top dead centre position.



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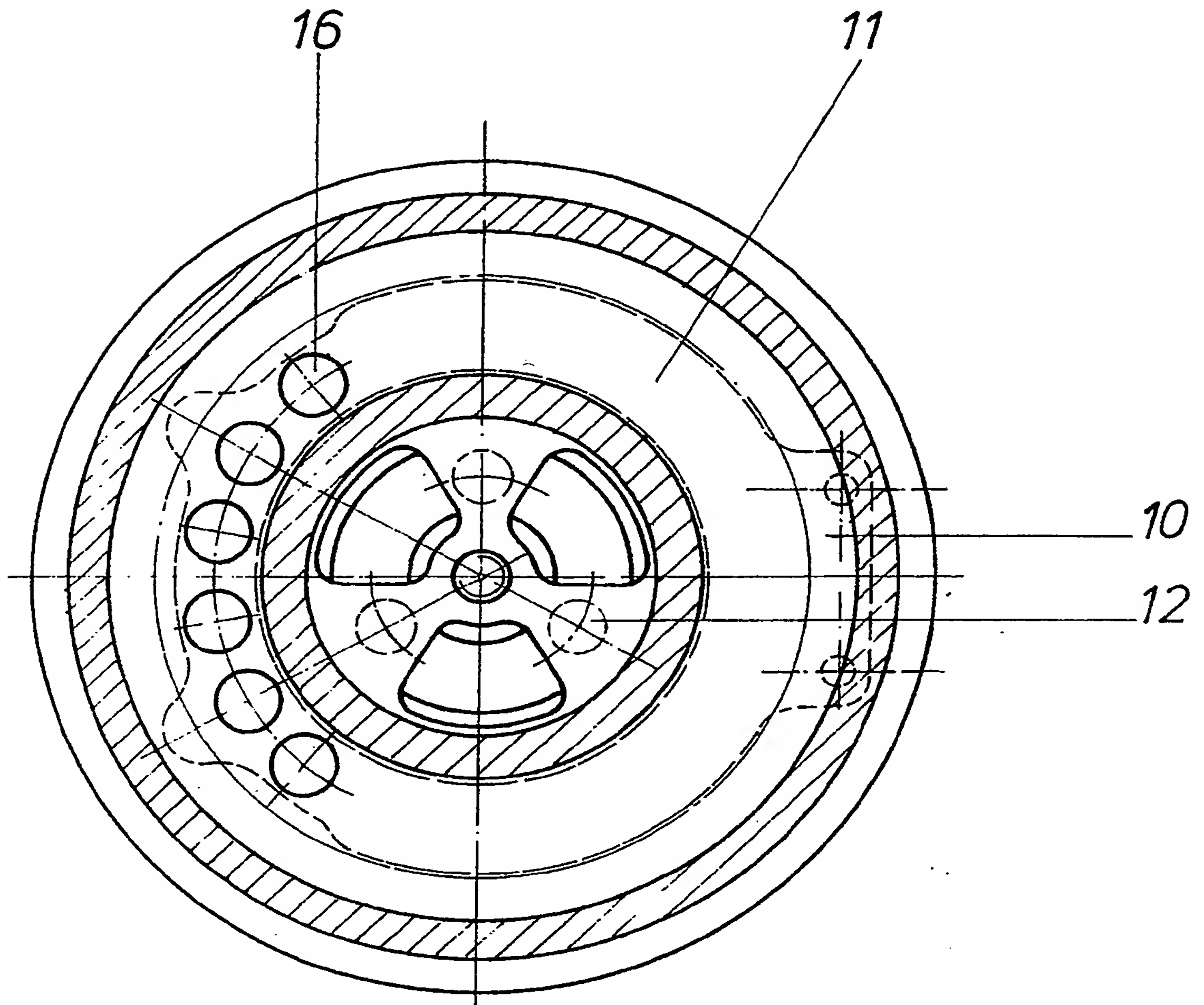
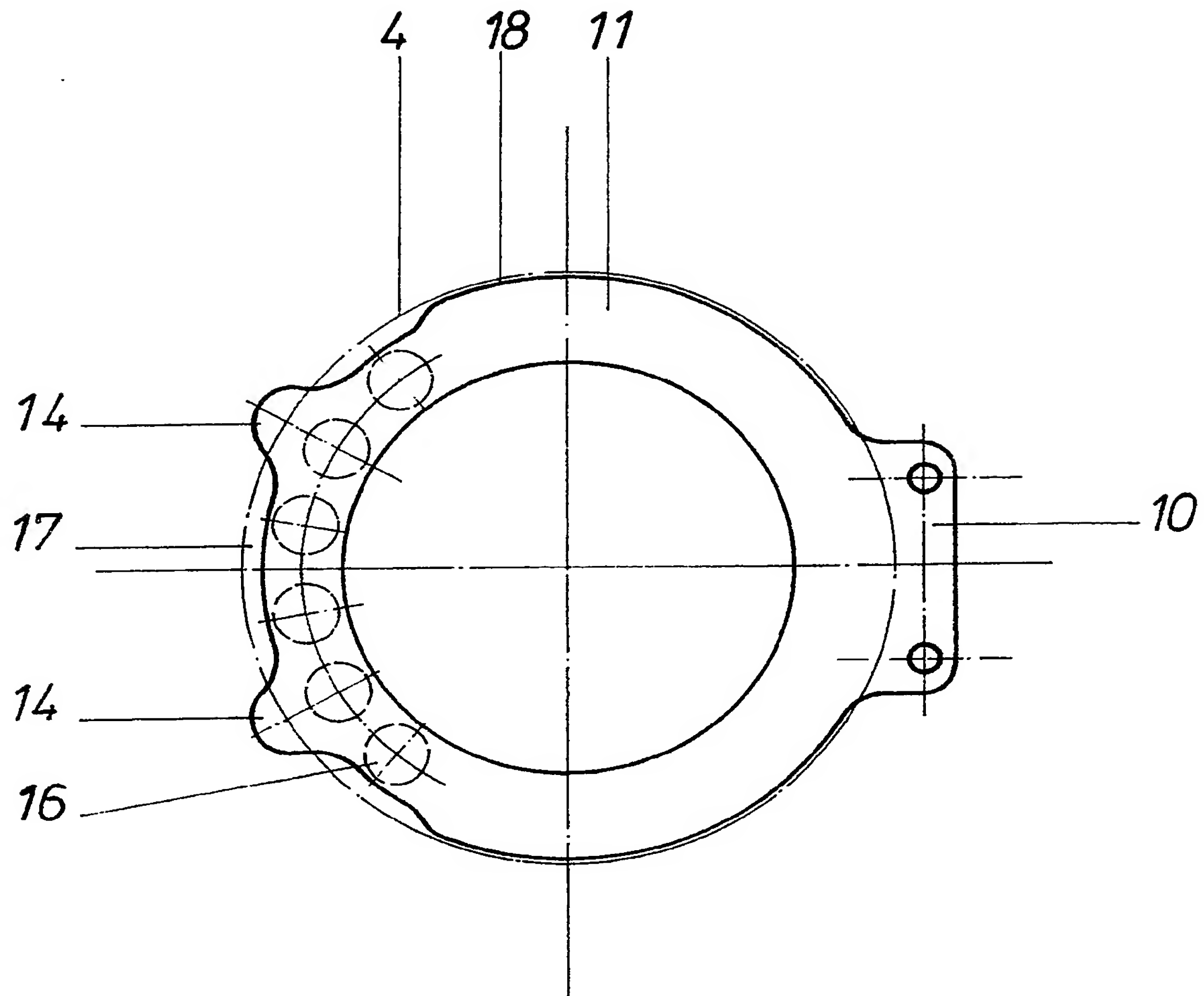


Fig. 2

*Fig. 3*

## SPECIFICATION

### Piston Compressor

The invention relates to a piston compressor, especially for small refrigerators or other heat pumps, having a seating plate which is sealed to and clamped between a cylinder head and a cylinder end surface together, on the cylinder side, with a root of an annular suction valve disc which covers, and is flexible away from, suction inlets in the seating plate to an extent limited by at least one projection from the disc engaging in a recess at the cylinder end surface; the edge of the valve disc being spaced by a gap from the cylinder bore for suction inflow to the cylinder; and the seating plate being provided, concentrically with the cylinder, with a pressure outlet having a pressure valve closure member between the seating plate and the cylinder head. Such a compressor is hereinafter referred to as of the kind described.

A piston compressor of this kind is described in DOS 1,503,406. The suction inlets and the suction inlet gap are evenly distributed around the suction valve disc which is not stressed. The suction inlet gap is therefore a long and narrow slot acting similarly to a labyrinth seal and offering to the sucked-in medium a large flow resistance. Because of its wide length of arc the gap contributes substantially to the unswept volume of the piston compressor. A similarly large unswept volume is formed in the upper dead centre position between the flat piston end and the opening in the suction valve disc and the pressure outlets in the seating plate.

Compressors such as these, for example for use in small refrigerators or heat pumps, must have a high degree of output while being simple and compact in construction, in other words a minimum unswept volume, while still retaining a very small suction resistance.

In order simultaneously to meet these divergent requirements, in accordance with the invention, in a piston compressor the kind described the suction inlets and suction inlet gap extend around an arc, preferably of substantially 90°, diametrically opposite the disc root, while the edge of the disc at both sides between the suction inlet gap and the root only has a working clearance with the cylinder bore; and the end of the piston is shaped substantially to nest with the pressure outlet.

The suction inlets are therefore compressed into a circumferential quadrant arranged opposite to the suction disc root mounting and this allows an adequate suction valve stroke of 1—3 mm. without a significant loss in suction. This is particularly conveniently achieved if the recess in which the disc projection engages is provided, at least partly, by a notch in a sealing disc between the seating plate and the cylinder end surface.

The fact that the suction inlet gap likewise is concentrated at the quadrant opposite to the suction disc root mounting, ensures that its circumferential extent is substantially smaller

than in the earlier construction but nevertheless a small suction resistance is provided.

The proportion of unswept volume at the outlet side is almost completely removed by nesting of the piston with the pressure outlet. For example the piston end may have a central hollow and surrounding annular projection to mate with an annular pressure outlet. Such an arrangement also provides a smaller flow resistance, in other words a smaller contribution towards the heating of the medium being conveyed, which medium is already cooled by the peripheral suction flow. This also helps to increase the conveying capacity whilst keeping the construction simple.

The invention is now explained in more detail with the aid of an example illustrated in the accompanying drawings, in which:—

Figure 1 is an axial cross-section through the valved part of a compressor;

Figure 2 is a section taken on the line II—II in Figure 1; and,

Figure 3 is a view from below in Figure 1 of the suction valve disc, the cylinder bore and suction inlets being indicated.

The illustrated piston compressor has a seating plate 5 which through resilient sealing discs 6,7, on both sides, and a sealing ring 8 is mounted under compression between an end face 3 of a cylinder 4 and a cylinder head or cover 9 by means of spacer bolts (not shown). Also mounted between the seating disc and the cylinder end face is a root 10 of an annular flexible suction valve closure disc 11. By means of locking springs 12, in spokes 13 of the head 9, (for clarity only one is shown in Figure 1), a pressure valve closure ring 2 is urged to close a pressure outlet 19 in the plate 5.

Tongues 14, on the disc 11 opposite the root 10, are closely surrounded by correspondingly shaped punched-out recesses 15 in the sealing disc 7 and by stepping down at the inner edge of the end face of the cylinder, to limit the flexure of the disc 11 by engagement with the cylinder end surface which they overlap. This circumferential area includes suction inlet holes 16 concentrated in the seating plate 5 and similarly a suction inlet gap 17 between the disc 11 and the bore 4 of the cylinder. In the remaining circumferential area there is provided only a working gap 18 of approximately 0.2mm between the disc 11 and the cylinder bore 1 (for the sake of clarity shown excessively large in Figure 3).

A central opening 1 in the disc 11, concentric to the suction inlet holes 16, extends over the annular nozzle-like pressure outlet 19 and its mushroom shaped centre part 20 which is screwed into the spokes 13. The centre part 20 forms an inner seating for the pressure valve closure ring 2. Into this nozzle a piston 21 nests at top dead centre, by means of a complementary cup-shaped recess 22 at its end face.

### Claims

1. A piston compressor having a seating plate which is sealed to and clamped between a

5 cylinder head and a cylinder end surface together,  
on the cylinder side, with a root of an annular  
suction valve disc which covers, and is flexible  
away from, suction inlets in the seating plate to  
an extent limited by at least one projection from  
the disc engaging in a recess at the cylinder end  
surface; the edge of the valve disc being spaced  
by a gap from the cylinder bore for suction inflow  
to the cylinder; and the seating plate being  
provided, concentrically with the cylinder, with a  
pressure outlet having a pressure valve closure  
member between the seating plate and the  
cylinder head; wherein the suction inlets and  
suction inlet gap extend around an arc  
diametrically opposite the disc root, while the  
edge of the disc at both sides between the suction  
inlet gap and the root only has a working

20 clearance with the cylinder bore; and the end of  
the piston is shaped substantially to nest with the  
pressure outlet.

25 2. A compressor according to claim 1, wherein  
the recess in which the disc projection engages is  
provided, at least partly by a notch in a sealing  
disc between the seating plate and the cylinder  
end surface.

3. A compressor according to claim 1 or claim  
2, wherein the pressure outlet is annular and the  
piston end has a complementary cup shaping.

30 4. A compressor according to any one of the  
preceding claims, wherein the arc extends around  
an angle of substantially 90°.

5. A compressor substantially as described  
with reference to the accompanying drawings.

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